NOTICE

The drivers and utilities for Octagon products, previously provided on a CD, are now in a self-extracting zip file located at the Octagon Systems web site on the product-specific page. Download this file to a separate directory on your hard drive, then double click on it to extract the files. All references in this manual to files and directories on the CD now refer to files in the Utilities zip file.

5556 Modem Card

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5556 Modem Card
User's Manual
5182(0501)

≡ FCC instructions

This product complies with part 68 of the FCC Rules and Regulations. With each device shipped, there is a label which contains, among other information, the FCC Registration Number and Ringer Equivalence Number (REN) for this product. You must, upon request, provide this information to your telephone company.

The REN is useful to determine the quantity of devices you may connect to a telephone line and still have all of these devices ring when the number is called. In most, but not all areas, the sum of the RENs of all devices connected to one line should not exceed five (5.0). To be certain of the number of devices you may connect to the line, as determined by the REN, you should contact the local telephone company to determine the maximum REN for your calling area.

If your system causes harm to the telephone network, the telephone company may discontinue service temporarily. If possible, they will notify you in advance. If advance notification is not practical, you will be notified as soon as possible.

Your telephone company may make changes in its facilities, equipment, operations, or procedures that could affect proper functioning of your equipment. If they do, you will be notified in advance to give you an opportunity to maintain uninterrupted telephone service.

If you experience trouble with this device please contact Octagon Systems for information on obtaining service or repairs. The telephone company may ask you to disconnect this device from the network until the problem has been corrected or until you are sure that the device is not malfunctioning.

This device may not be used on coin service lines provided by the telephone company (this does not apply to private coin telephone applications, which use standard telephone lines). Connection to party lines is subject to state tariffs.

≡ Preface

This product sheet is a guide to the proper configuration, installation, and operation of your 5556 Modem Card. The 5556 expansion card is part of the Octagon Micro PC system. It is designed to be used with any other Micro PC Control Cards. You can use your 5556 card in conjunction with other Micro PC expansion cards, tailoring your system for a wide variety of applications. The 5556 card can also be used in an IBM-compatible PC. Micro PC

cards are too tall to fit in an XT, but will fit in AT industrial size and other AT-size cases. All Micro PC products are modular, so creating a system is as easy as selecting and plugging in the products you need.

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Overview

Introduction

The 5556 Micro PC Modem Card is a compact 56K BPS data modem solution for the Micro PC product line. It supports baud rates up to 56K. It is AT command set compatible and will work with any popular AT compatible communication software written for the PC. The 5556 complies with the Bell System 103/212A and CCITT V.22/V.22bis/V.21 protocols. It can be used with any Micro PC Control Card or Microcontroller and occupies one slot in a Micro PC card cage.

Major features

- Compatible Hayes AT command set
- Supports the following protocols:
  - Bell System 103 and 212A
  - V.21, V.22, V.22bis, V.23, V.32, V.32bis, V.34, V.34bis, V.90
- Automatic speed selection/Automatic fallback to slower speed
- Auto–originate and auto–answer modes
- Dialing capabilities:
  - Autodial in tone or pulse
  - Call progress monitoring
  - Programmable number of rings before answer
- 5V operation

This chapter covers the installation and configuration of your 5556 Modem Card. Please refer to your software documentation for additional information on installation and configuration of a modem. The 5556 may be used with any Micro PC Control Card.

The 5556 contains static sensitive CMOS components. The greatest danger occurs when the card is plugged into a card cage. The 5556 becomes charged by the user and the static discharges to the backplane from the pin closest to the card connector. If that pin happens to be an input pin, even TTL inputs may be damaged. To avoid damaging your card and its components:

1. Ground yourself before handling the 5556 Modem Card.
2. Disconnect power before removing or inserting the 5556 card.

Equipment

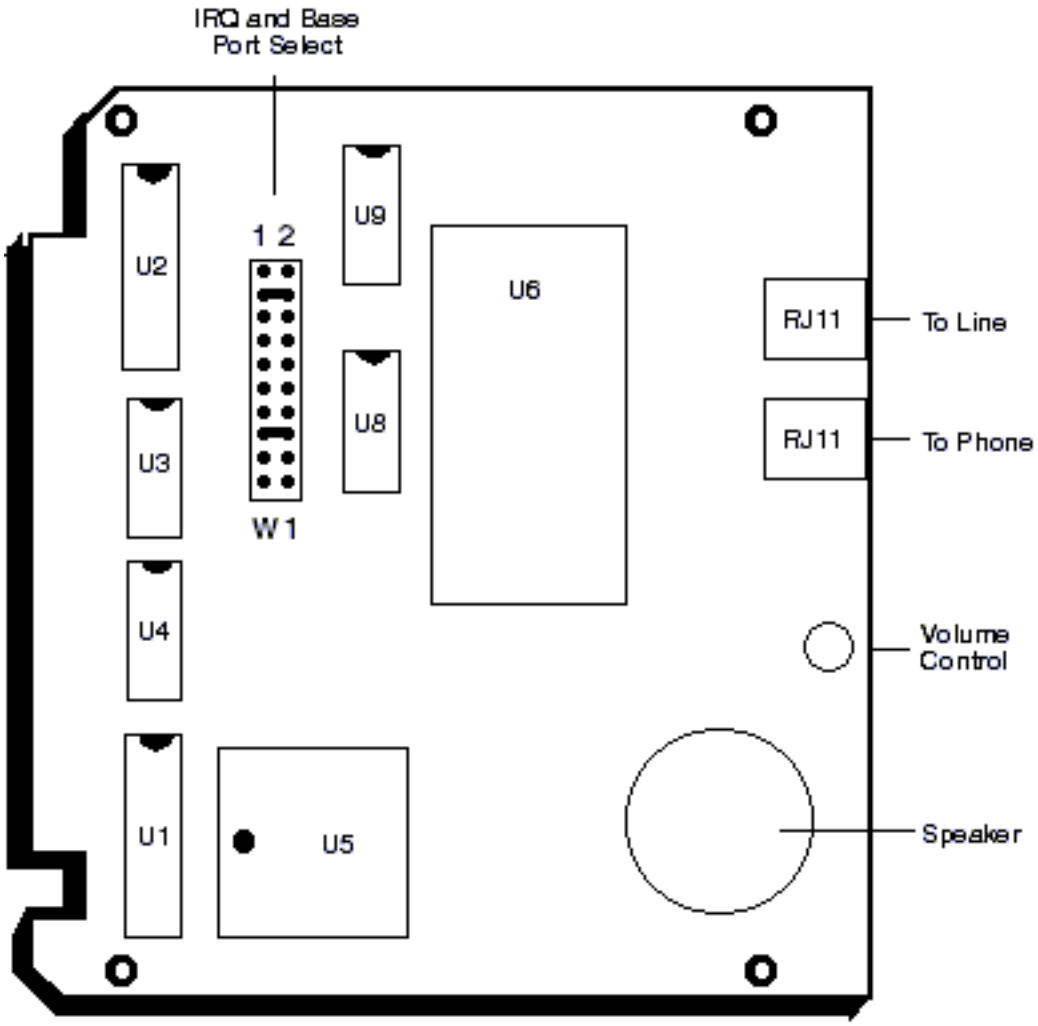
You will need the following equipment (or equivalent) to use your 5556:

- Micro PC Control Card
- 5556 Modem Card
- Micro PC Card Cage
- Power Module
- Communication software

Installation

Before installing the 5556 Modem Card, refer to Figure 1 for the location of various connectors and jumpers:

Figure 1 5556 Component diagram



Interrupt request

The interrupt request line used by the modem is configured at the factory for IRQ3. You may change this setting by reconfiguring jumper block W1:

Table 1 Interrupt request lines: W1

Pins Jumpered	IRQ
[1-2]	IRQ2
[3-4]*	IRQ3
[5-6]	IRQ4
[7-8]	IRQ5
[9-10]	IRQ6
[11-12]	IRQ7
* = default	

Base port address

The 5556 can be configured as COM1, COM2, COM3 or COM4. It is configured at the factory to operate using COM3. To change the base port address, you must reconfigure jumper block W1.

Table 2 Base port address: W1

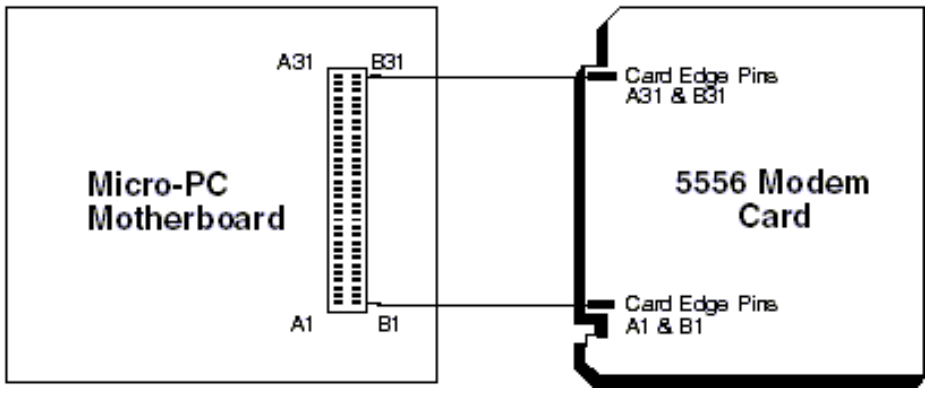
Pins Jumpered	COM port	Address
[13-14]	COM4	2E8-2Efh
[15-16]*	COM3	3E8-3Efh
[17-18]	COM2	2F8-2FFh
[19-20]	COM1	3F8-3FFh
* = default		

Note When using Micro PC Control Cards, be sure not to jumper the 5556 to a COM port that is used on another card. Doing so will cause erratic and unpredictable results.

To install the 5556 in the card cage:

Take care to correctly position the 5556 in the card cage. The Vcc and ground signals must match those on the backplane. Figure 2 shows the relative position of the 5556 as it is installed in the card cage.

Figure 2 5556 Card orientation



1. Verify the interrupt and COM port selections are correct for your application.
2. Turn the card cage power off.
3. Position the cage so that the backplane is away from you, the power module is to the right, and the open side of the cage is closest to you. The lettering on the backplane should be right side up (for example, you should be able to read "A31" on the backplane), with the words "OCTAGON SYSTEMS CORP." running vertically along the left side of the backplane. This position is "feet down" for a table mount cage and "feet back" for a rear mount.
4. Slide the 5556 into the card cage. The components on the card should face to the left. The lettering on the card ("Octagon Systems Corp.") should be on the top edge of the card and the gold contact fingers toward the backplane.
5. Plug the 5556 into the backplane.
6. The amber LED will light briefly whenever the card is accessed (input or output).
7. Unplug your telephone set's modular cable connector from the wall jack. Then plug it into the jack labeled PHONE on the 5556 (optional). (When using the 5556's automatic features, there is no need to have the telephone plugged in.)

8. Plug one end of a second modular telephone cable into the jack labeled LINE on the 5556 and the other end into the wall telephone jack.

9. Power on your system.

10. Set the communications speed of the 5556 to baud rates up to 56K BPS. The 5556 defaults to 56K BPS when first powered on. Also set the character length, parity and stop bits. Refer to your software manual for more specific information.

Note Be sure that the settings you select for the 5556 are compatible with the remote modem you are accessing.

11. To verify the 5556 is on–line and working correctly, select local or terminal mode on your software program. Type:

    ```
    AT <Return>
    ```

    An OK message displays. If you do not receive this message:

    - Make sure that the speed setting is 56K BPS in the Communication Program
    - Make sure your software program is set for an AT modem
    - Also refer to the *Troubleshooting* section

AT commands

Introduction

The 5556 Modem Card is AT command compatible. To use the 5556 modem, you must have access to some type of communications software. When selecting a communications software program be sure that it supports the basic AT command set.

Operating modes

All modems operate in two modes — command and on–line modes. When the modem is in the command mode, it will accept all AT commands. The modem only returns result codes when in the command mode.

The modem is in the on–line mode when it has successfully connected to another modem. In the on–line mode, data sent to the modem from your system is transferred directly to the remote modem and data received from the remote modem is transferred directly to your system.

To switch between modes, the following two commands are used:

- **Escape sequence** (+++) sets the modem from the on–line mode back to a command mode and
- **ATO command** returns the modem back to the online mode again after a +++ has been issued

Escape sequence

Once the modem is on–line, the special escape sequence of +++ returns the modem to the command mode without breaking the modem's connection. To issue the escape sequence once the modem is on–line. Type:

+++

After the third plus is entered, the modem should respond with an "OK" or "0". (The command +++ is not followed by a carriage return).

The escape character (+) may be changed to any other character by changing the value in the S2 register. Refer to the table on S–Register commands.

Returning to online mode

Once you have issued an escape sequence to the modem, you are still connected to the remote modem but in the command mode. To return to the online mode and continue communications with the remote system, use the O command, type:

ATO

The modem will respond with a message and return you to the on–line mode.

AT commands

All commands sent to the modem must begin with the attention code AT (except for the +++ (escape) and the A/ (repeat)) commands. The following tables group the commands by function.

Table 3 Prefix, repeat, and escape commands

Command	Description
AT	Command line prefix that tells the modem a command follows; must precede all of the commands, except for the +++ (escape) and A/ (repeat) commands.
A/	Re-execute last command line, don't precede this command with AT or press <Enter? at the end of the command line.
+++	Escape code: go from on-line mode to command mode; One second pause before and after escape code entry. The command +++ is not followed by a carriage return.

Table 4 Set 300/1200 BPS protocol

Command	Description
B0	Uses CCITT V.22/2100 Hz answer backtone at 1200 BPS
B1	Uses Bell 212A/2225 Hz answer backtone operation at 1200 BPS

Table 5 Dialing options

Command	Description
D	Dial telephone number
P	Pulse dialing
R	Originate call in answer mode
T	Touch–tone dial
!	0.5 second hookflash
@	Wait for silence (default 5 seconds)
W	Wait for dial tone (default 30 seconds; see register S7)
,	Pause (default 2 seconds; see register S8)
;	Return to command mode after dialing

Table 6 Echo commands

Command	Description
E0	Command characters not echoed
E1*	Command characters are echoed
* = default	

Table 7 Hook control

Command	Description
H0*	Force modem on–hook, i.e. hang up
H1	Force modem off–hook, i.e. make the line busy
* = default	

Table 8 Volume control

Command	Description
L0*	Low speaker volume
L1	Low speaker volume
L2	Medium speaker volume
L3	High speaker volume
* = default	

Table 9 Speaker on/off

Command	Description
M0	Speaker is always off
M1*	Speaker is on until modem detects carrier
M2	Speaker is always on
M3	Speaker is on after dialing until modem detects carrier
* = default	

Table 10 Enable/disable result codes

Command	Description
Q0*	Enable result codes
Q1	Disable result codes
* = default	

Table 11 Read/write to S registers

Command	Description
Sn? Sn=v	Read and display value of register r Set default S register to value v

Table 12 Result code and dialing options

Command	Description
X0 X2 X3 X4	Basic call progress, blind dialing Extended call progress, dial tone detection Extended call progress, blind dialing and busy signal detection Extended call progress, dial tone, and busy signal detection

Table 13 Long space disconnect

Command	Description
Y0* Y1	Long space disconnect disabled Long space disconnect enabled
* = default	

Table 14 Carrier detect (DCD) options

Command	Description
&C0* &C1	DCD always on; state of carrier signal is ignored DCD on only in presence of carrier signal
* = default	

Table 15 Data terminal ready (DTR) options

Command	Description
&D0 &D1 &D2* &D3	Ignore DTR signal Return to command mode after losing DTR DTR always active, hang up after transition Modem performs soft reset
* = default	

Table 16 Guard tone

Command	Description
&G0*	No guard tone
&G1	Disable guard tone
&G2	1800 Hz guard tone
* = default	

Table 17 Make/break pulse ratio

Command	Description
&P0*	10 pps pulse dial with make /break dial ratio of 39/61 (USA/Canada)
&P1	10 pps pulse dial with make/break dial ratio of 33/67 (Europe/Hong Kong)
&P2	20 pps pulse dial with make/break dial ratio of 33/67 @20pps
* = default	

Table 18 Other commands

Command	Description
A	Answer incoming call immediately
O	Return to on–line mode
P	Set pulse dial as default
T	Set tone dial as default
V0	Send numeric result codes
V1*	Send word result codes
Z	Reset modem and set modem to factory default states
&F	Restore factory configuration
&J0*	RJ11, RJ14S, or RJ45S phone jack
&L0	Dial–up line
&M0*	Asynchronous operation
&V	Display current configuration
* = default	

Result codes

The 5556 responds to most AT commands with the following result codes:

Table 19 Result code summary

Digit	Code	Definition
0	OK	Successfully executed command line
1	Connect	300 BPS connection established
2	Ring	Ring signal detected
3	No carrier	Carrier not detected within Register S7 detect time
4	Error	Error found in command line; return to command line
5	Connect 1200	1200 BPS connection established
6	No dial tone	No dial tone detected within 5 seconds after going off–hook
7	Busy	Busy signal detected after automatically dialing a call
8	No answer	Five seconds of silence was not detected when using the @ command in the Dial command line
10	Connect 2400	Connection established at 2400 BPS

S–Register

The S–Register stores the current configuration of the 5556. These settings are changed directly via "S" commands or indirectly via commands such as the &C command. For example, each time a &C command is issued, the content of S–Register 21 is altered. Use the Z or &F command or power–off/on the modem to restore the default settings. The following table lists the S–Register default settings:

Table 20 S–Register summary

Register	Range/Units	Description	Default
S0	0–255/rings	Number of rings to answer on	000
S1	0–255/rings	Count number of incoming rings	000
S2	0-255/ASCII	Escape character	043
S3	0-127/ASCII	Carriage return character	013
S4	0-127/ASCII	Line feed character	010
S5	0-255/ASCII	Backspace character	008
S6	2-255/sec	Dial tone wait time	002
S7	1-255/sec	Wait time for remote carrier	050
S8	0-255/sec	Comma pause time	002
S9	1-255/0.1 sec	Carrier detect response time	006
S10	1-255/0.1 sec	Delay between loss of remote carrier and hang up	014
S11	50-255/msec	DTMF dialing speed	095
S12	0-255/0.02 sec	Escape guard time	050
S13	—	Reserved	
S14	Bit mapped		138 (8Ah)
S15	—	Reserved	
S16	Bit mapped	Test mode bit mapped options status (&T)	000
S17	—	Reserved	
S18	0-255/sec	Modem test timer	000
S21	Bit mapped	V.24 bit mapped status options	52 (34h)
S22	Bit mapped	Speaker/results bit mapped status options	117 (75h)
S23	Bit mapped	General bit mapped options status	62 (3Dh)
S24	—	Reserved	
S25	0-255/0.01 sec	DTR detection delay (sync only) or seconds	005
S26	0-255/0.01 sec	RTS to CTS delay	001
S27	Bit mapped	General bit mapped options status	73 (49h)

Troubleshooting

Numbers instead of words display

Use the ATV1 command to display long form (verbose) results code.

Type the AT command and do not receive an OK message

Make sure your software program is set for an AT modem. Also make sure that the speed setting of your software program or terminal is set at 57,600 BPS and that the character length set correctly.

The modem does not respond to your commands

Make sure you have selected the correct COM port in your communications software program. Make sure the W1 jumpers on the 5556 are set to the correct COM port.

The command characters do not appear on the screen

Type ATE1 <Return> and then type AT. Or, use the echo/no echo feature in your software program.

Double letters appear on the screen when typing commands

Both your software program and modem are echoing commands to the screen. Use either your software program‘s echo–off command or type ATE0 <Return>.

Technical specifications

Data rate

Up to 56K BPS

Data format

7 or 8 data bits; 1 or 2 stop bits; odd, even or no parity

Operation

Full duplex

Dialing

Rotary (pulse) or touchtone; pulse or tone may be combined in same dial string. Timed pulse or wait for next dial tone.

Compatibility

Bell System 103/212A and CCITT V.22/V.22bis/V.21, V.23, V.32, V.32bis, V.34, V.34bis, V.90.

Phone connectors

Two RJ11C telephone jacks; one for telephone line connect; one for telephone set.

Audio monitor

On–board speaker for call progress monitoring.
Built in DAA

Power requirements

+5V +/–.25V @ 115 mA typical

Environmental

–40° C to –85° C

Size

4.5 in. x 4.9 in.

Other parameters

Table 21 Performance specifications

Parameter	Min	Typ	Max	Comment
DTMF level		–7.5 dBM	0 dBM	
DTMF twist (balance)			3 dB	
DTMF tone duration		70 ms		
Pulse dialing rate		10 pps	20 pps	
Pulse dialing make/break		39/61%		USA
		33/67%		CCITT
Pulse interdigit interval		785 ms		
Billing delay interval	2.0 sec			
Guard tone				Referenced to high channel
Frequency		550 Hz		transmit
Amplitude		–3 dB		
Frequency		1800 Hz		
Amplitude		–6 dB		
High channel transmit amplitude		–1 dB		Referenced to low channel guard tone enabled
Tone detection bandpass frequency	290 Hz		665 Hz	3 dB point
Tone detection Off to On threshold	–33 dBM			into 600 ohms
Tone detection On to Off threshold	–35 dBM			into 600 ohms
Dial tone detect duration	3.0 sec			
Ringback tone detect				
Duration	0.75 sec			Off/On ratio
Cadence	1.5 sec			
Busy tone detect				
Duration	0.2 sec			Off/On ratio
Cadence	0.67 sec		1.5 sec	

Table 22 Telephone line interface specifications

Parameter	Min	Typ	Max
Telephone line impedance match		600 ohms	
Ring detect sensitivity	38 Vrms		
(on hook, type B ringer)			
Telephone line holding current	0 mA	20 mA	100 mA

Jumper configurations

Table 23 Interrupt request lines: W1

Pins jumpered	IRQ
[1-2]	IRQ2
[3-4]*	IRQ3
[5-6]	IRQ4
[7-8]	IRQ5
[9-10]	IRQ6
[11-12]	IRQ7
* = default	

Table 24 Base port address: W1

Pins jumpered	COM port	Address
[13-14]	COM4	2E8-2EFH
[15-16]*	COM3	3E8-3EFH
[17-18]	COM2	2F8-2FFH
[19-20]	COM1	3F8-3FFH
* = default		